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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/733,133	12/08/2000	Jung S. Yi	C-2377A	4000

7590

10/03/2002

M. P. Williams
210 Main Street
Manchester, CT 06040

EXAMINER

TSANG FOSTER, SUSY N

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 10/03/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/733,133

Applicant(s)

YI ET AL.

Examiner

Susy N Tsang-Foster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

It is suggested to the applicants to rewrite the cross-reference to related applications as "This is a continuation-in-part of U.S. Serial No. 09/542,778, filed April 4, 2000, now abandoned, which is a continuation-in-part of U.S. Serial No. 09/466,701, filed December 17, 1999, now abandoned."

Information Disclosure Statement

The information disclosure statement filed 12/8/2000 fails to comply with 37 CFR 1.98(a)(1), which requires a list of all patents, publications, or other information submitted for consideration by the Office. It has been placed in the application file, but the information referred to therein has not been considered.

Applicants have cited 37 CFR 1.98(d) in the information disclosure statement filed 12/8/2000 in order to rely upon the information disclosure statements filed in the parent application, Serial No. 09/542,778. However, section (d) of 37 CFR 1.98 pertains to whether submission of copies of references is required. See reproduction of 37 CFR 1.98(d) below:

A copy of any patent, publication, pending U.S. application or other information, as specified in paragraph (a) of this section, listed in an information disclosure statement is required to be provided, even if the patent, publication, pending U.S. application or other information was previously submitted to, or cited by, the Office in an earlier application, unless:

- (1) The earlier application is properly identified in the information disclosure

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statement and is relied on for an earlier effective filing date under 35 U.S.C.

120; and

(2) The information disclosure statement submitted in the earlier application complies with paragraphs (a) through (c) of this section.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the fuel cell having both interdigitated water transport plates and interdigitated anode and cathode support plates must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The drawings only show a fuel cell having a porous water transport plate with interdigitated flow channels or the anode/cathode support plate having the interdigitated flow channels and not both.

Figure 12 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

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The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 12a, 12b, 93', 88', 89', and 102'.

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because it exceeds 150 words in length.

Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities:

On page 25, line 21, "then" should be "than".

Appropriate correction is required.

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The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

In claim 1, the limitations that an anode support plate, a cathode support plate, a first porous water transport plate, and a second porous water transport plate all have an interdigitated passageway do not appear to be in the specification.

In claim 10, the range “0.5 psi to 10 psi” does not appear to be in the specification.

In claims 19 and 20, the limitation “operating said fuel cell at a maximum current density of at least 1.6 amps per square centimeter in response to a corresponding electrical load across said fuel cell; and operating said fuel cell at current densities of less than 1.6 amps per square centimeter in response to related electrical loads across said fuel cell” does not appear to be in the specification.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 2 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not describe how a fuel cell functions with a porous water

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transport plate having interdigitated reactant flow channels placed adjacent an anode or cathode support plate having interdigitated reactant flow channels. It would be undue experimentation to one of ordinary skill in the art to determine how to make an operational fuel cell having a porous water transport plate having interdigitated reactant flow channels placed adjacent an anode or cathode support plate having interdigitated reactant flow channels as well since it is unclear how the reactant flows through both sets of interdigitated reactant flow channels placed adjacent one another.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7, 14, 15 and 17-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites the limitation "said hydrophilic substrate layer of said cathode support plate" in line 2. There is insufficient antecedent basis for this limitation in the claim.

In claim 14, the limitation "a diffusion layer disposed between said substrate layer" is indefinite because it is unclear which substrate layer is meant.

In claim 17, the limitation "both said support plates comprise a porous substrate layer and wherein said fuel cell power plant further comprises a porous water transport plate adjacent to each of said support plate" is indefinite because it is unclear if the porous substrate layer is the same substrate layer mentioned in claim 5 and if the porous water transport plate of claim 5 is not one of the porous water transport plate mentioned in claim 17.

In claims 19 and 20, the limitation "operating said fuel cell at a maximum current density of at least 1.6 amps per square centimeter in response to a corresponding electrical load across said fuel cell; and operating said fuel cell at current densities of less than 1.6 amps per square centimeter in response to related electrical loads across said fuel cell" is indefinite because it is unclear what the related electrical loads are across the fuel cell and it is unclear how the fuel cell can be operating at a maximum current density of at least 1.6 amps per square centimeter and at current densities of less than 1.6 amps per square centimeter simultaneously.

Claims depending from claims rejected under 35 USC 112, second paragraph are also rejected for the same.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson (US Pat. No. 5,641,586) in view of Dufner et al. (US Pat. No. 6,024,848).

Wilson discloses a fuel cell power plant comprising an anode support plate and a cathode support plate and a membrane electrode assembly disposed between the anode and cathode support plates, the membrane electrode assembly comprising a polymer electrolyte membrane disposed between the two catalysts and the cathode support plate and the anode support plate

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(the macroporous layer) each comprises a hydrophilic substrate layer having pores therein (see Figures 1B and 1C; col. 1, lines 10-16; col. 3, lines 26-32; lines 52-57; col. 4, lines 44-47).

Flow-field plates containing reactant distribution channels where the channels are adjacent the porous hydrophilic substrate layer (col. 3, lines 44-50). Wilson also discloses that interdigitated channels are formed in porous substrate layers (col. 4, lines 5-7) for oxidant gas and fuel reactant gas to enter therein and exit therefrom on the cathode side and anode side respectively. Wilson also discloses that reactant distribution channels in the flow field plates disposed against each of the support plates may be interdigitated instead of the support plates having interdigitated flow channels (col. 3, lines 40-45).

Wilson does not disclose that the flow field plate against each of the support plates is a porous water transport plate adjacent to the cathode support plate or to the anode support plate and the porous water transport plate having a passageway for a coolant stream to pass and means for creating a predetermined pressure differential between the reactant gas stream and the coolant stream such that the pressure of the reactant gas is greater than the pressure of the coolant stream.

Dufner et al. teach that it is known to add porous water transport plates which are also the flow field plate adjacent the support layers (col. 3, lines 5-10) wherein the water transport plates each have a passageway for a coolant stream (see Figure 2), and to operate the coolant stream at a pressure differential of about 2-3 psi less than that of the reactant gas (col. 8, lines 19-25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the porous water transport plates of Dufner et al. which are also flow field plates adjacent the anode and cathode support plates of Wilson because the porous water

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transport plates would facilitate liquid water transport, that is water management, and cooling throughout the fuel cell as taught by Dufner et al. (col. 3, lines 5-10 of Dufner et al.).

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to operate the coolant stream at a pressure differential of about 2-3 psi less than that of the reactant gas because Dufner et al. teach that the pressure differential would displace most of any liquid water from pores of the substrate layer, thereby facilitating gas transfer while retaining acceptable liquid and gaseous water transfer in the fuel cell system (col. 8, lines 9-24).

Conclusion

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9310 for regular communications and (703) 872-9311 for After-Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/28 September 2002

Susy Tsang-Foster